

CLAIMS

What is claimed is:

1. A method of producing a weld between two aluminum alloy sheets, comprising the steps of:
 - (A) pressing the sheets into contact with each other;
 - (B) producing a molten weld nugget at a spot between the contacting sheets; and,
 - (C) promoting the formation of an equiaxed grain structure within the weld nugget by introducing particles into the molten nugget on which the equiaxed grain may grow as the nugget cools and solidifies.
2. The method of Claim 1, wherein the particles contain Ti.
3. The method of Claim 1, wherein the particles are a material selected from the group consisting of:
 - (a) Al + Ti
 - (b) Al + Ti + C
 - (c) Ti-B alloy
 - (d) Na
 - (e) Al + Ti-B alloy
 - (f) Al-Ti-B-Re alloy
 - (g) Al-Ti-C alloy.
4. The method of Claim 1, wherein the particles are a material containing Na.

5. The method of Claim 1, wherein step (C) is performed by introducing a powder containing the particles between the aluminum sheets in the area of the spot.
6. The method of Claim 1, wherein step (C) is performed by introducing a film of material containing the particles between the aluminum sheets.
7. The method of Claim 1, wherein step (C) is performed by applying a paste containing the particles to at least one of the sheets in the area of the spot before step (A) is performed.
8. The method of Claim 1, wherein step (B) is performed by passing an electrical current through the sheets at the area of the spot.
9. A spot weld produced by the method of Claim 1.
10. A method of producing a fusion bond between two aluminum alloy workpieces, comprising the steps of:
 - (A) bringing areas of the workpieces into contact with each other;
 - (B) melting a spot on the contacting workpiece areas; and,
 - (C) promoting the growth of equiaxed grain structure within the molten spot as the molten spot cools and solidifies, the growth promotion being performed by introducing a substance into the molten spot selected from the group consisting of:
 - (a) Al+Ti
 - (b) Al+Ti+C
 - (c) Ti-B alloy
 - (d) Na
 - (e) Al+Ti-B alloy
 - (f) Al-Ti-B-Re alloy

(g) Al-Ti-C alloy.

11. The method as set forth in claim 10, wherein step (C) is performed by introducing a film containing the substance between the aluminum alloy workpieces.

12. The method of Claim 10, wherein step (C) is performed by applying a paste containing the substance to one of the workpieces.

13. The method of Claim 10, wherein steps (C) is performed by applying introducing a powder containing the substance between the workpieces.

14. A fusion bond produced by the method of Claim 10.

15. A spot weld between two sheets of aluminum alloy and exhibiting improved mechanical strength, formed by the method comprising the steps of:

(A) pressing the sheets into contact with each other;

(B) producing a molten weld nugget at a spot between facing surfaces of the sheets;

(C) allowing the molten weld nugget to cool and thereby solidify; and,

(D) promoting the formation of an equiaxed grain structure within the nugget by introducing particles into the molten nugget on which the equiaxed grain may grow as the molten nugget cools and solidifies.

16. The method of Claim 15, wherein the particles include Ti.

17. The method of Claim 15, wherein the particles include Na.

18. The method of Claim 15, wherein the particles are formed of a material selected from the group consisting of:

- (a) Al+Ti
- (b) Al+Ti+C
- (c) Ti-B alloy
- (d) Al+Ti-B alloy
- (e) Al-Ti-B-Re alloy
- (f) Al-Ti-C alloy.

19. The method of Claim 15, wherein the particles are introduced by applying a paste containing the particles on at least one of the alloy sheets.

20. The method of Claim 15, wherein the particles are introduced by applying a powder containing the particles to at least one of the alloy sheets.

21. The method of Claim 15, wherein the particles are introduced by interposing a film containing the particles between the alloy sheets.

22. The method of Claim 15, wherein step (B) includes passing an electrical current through the sheets in the area of the spot.